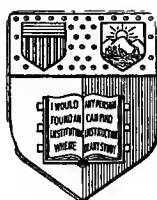


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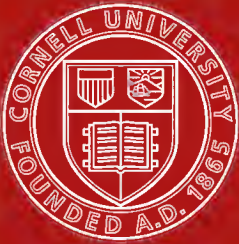
SPECIAL REPORT

ON

PICTOU CATTLE DISEASE

1906

OTTAWA.
GOVERNMENT PRINTING BUREAU
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SPECIAL REPORT

ON

PICTOU CATTLE DISEASE, 1906

OTTAWA, March 31, 1906.

I have the honour to report that the results of the investigation into the nature and causes of Pictou Cattle Disease, which was begun at Antigonish in October, 1903, have been sufficiently definite to warrant me in recommending the removal of this malady from the list of those coming under the operation of the Animal Contagious Diseases Act. For upwards of twenty years it has been the policy of the department to order the slaughter of affected animals and to pay compensation for them, as also to insist on the disinfection of the buildings in which they have been kept. During the whole of this time, and in fact for many years previous, the more intelligent residents of the district in which the disease prevails have been of the opinion that it is not only non-contagious, but that its prevalence is due to or connected in some way with the weed known as *Senecio Jacobea* or Ragwort, locally known as Stinking Willie. Evidence existed to show that the disease was unknown until the weed in question was accidentally introduced with ballast brought from Scotland to the town of Pictou some fifty years ago. Once established the plant spread gradually through the surrounding country, extending, however, owing to the prevailing winds, the seed being light and easily carried by their agency, to a much further distance eastward than westward of its original starting point. Shortly afterwards the disease made its appearance, and although some years elapsed before any suspicion as to the weed being its cause was aroused, it was at last noted as a peculiar coincidence that only the cattle kept in the weedy area were affected. As time passed it was further observed that the mere presence of the plant in a district was not apparently sufficient to produce the affection, but that it was only after it had obtained a firm foothold in the pastures and meadows that the disease began to make its appearance.

About the year 1882, an attempt at investigation was made and some experiments were undertaken with a view to ascertaining whether or not there was any foundation for the popular belief as to the connection between the weed and the disease, which, by this time, had been recognized as a peculiar and almost specific cirrhosis of the liver. Unfortunately, however, these experiments were unsuccessful in throwing any new light on the subject, with the result that Pictou Cattle Disease was declared to be contagious, and the policy of slaughter and compensation above referred to brought into force. From time to time in after years, the subject was investigated by Dr. William Osler, Dr. Adami, the late Dr. Wyatt Johnston and other skilled pathologists, but invariably with negative results, so far at least as concerned the establishment of any definite and intelligent theory as to its true nature and causes.

During the whole of this time close observers in the affected district were becoming each year more strongly convinced that Ragwort, and that alone, was responsible. Many of these men, although receiving little encouragement to do so, took steps to eradicate the plant from their farms and to induce their neighbours to do likewise, with the result that their animals remained unaffected, while those kept on weedy farms sickened and died. These conditions were especially noticeable when, in addition to keeping the weed down in the pastures, care was taken to remove it from the hay fed during the winter. It was also observed that in years when scarcity of hay necessitated wintering cattle on straw, animals so treated seemed to be immune. In the light of our recent experiments, it seems almost incredible that these and similar facts did not sooner force a full recognition of the true situation, which would have undoubtedly been the means of inaugurating a campaign of extermination against the weed at a time when such a task would have been much less difficult than now.

For some years Dr. Gilruth, Chief Veterinarian and Bacteriologist to the Government of New Zealand, devoted considerable attention to a peculiar hepatic cirrhosis known in that colony as Winton Disease, and from which, up to 1901, and these in one locality only, horses had appeared to suffer to a greater extent than either cattle or sheep. Dr. Gilruth initiated some experiments and finally reached the conclusion, without doubt well justified, that the trouble was entirely due to the ingestion of Ragwort. His experiments, while convincing, were not, owing to apparently unavoidable circumstances, conclusive, although strengthened by corroborative evidence from Cape Colony, where a like disease has been traced by Mr. W. H. Chase, Government Veterinarian, to the agency of another plant of the same species, *Senecio Burchelli*.

For the above and other apparent reasons, such as the different climatic, economic and dietetic conditions and the lack of absolute proof of the identity of Pictou Cattle Disease with the Hepatic Cirrhosis of the Antipodes, his decision could not, with propriety, have been accepted by this department as the basis for a complete change of policy even had it been made public before the inauguration of our experimental work at Antigonish in 1903.

The latter has been very interesting and its results are convincingly corroborative of the views of those who have consistently held to the ragwort theory.

My last report contained a full account of what had been done during the year preceding October 31, 1904, together with our findings up to that date, but in order to make the case perfectly clear, I think it best to recapitulate the main points before proceeding to deal with the intervening period.

In October, 1903, I, with your approval, leased, for experimental purposes, a farm of 200 acres at Cloverville, county of Antigonish, Nova Scotia. This farm is, of course, situated within the ragwort area, but is further well known as one on which the disease in former years frequently made its appearance. Thirty-four cattle were purchased, four of which had been raised on the premises, the remainder being secured from districts in which there is no ragwort. Sixteen head, including the four natives, were placed in an old stable on the premises, in which at different times thirty-six cattle had died from hepatic cirrhosis. They were fed entirely on food imported from Quebec. Four were given a liberal allowance of sound hay with a full grain ration, four a liberal allowance of hay with a smaller grain ration, four a liberal allowance of hay without grain, and four a limited allowance of hay only.

The other eighteen head were placed in an entirely new stable, erected at a considerable distance from the old buildings. Sixteen of these were divided into quartettes and fed in exactly the same way as above mentioned, except that the hay given to them, being secured in the neighbourhood, contained a considerable quantity of ragwort.

The remaining two cattle were housed together in a separate compartment of the new stable, one being fed on chopped ragwort and the other on oat straw, a small ration of bran being given to each.

The progress of the experiments up till October 31, 1904, was described in my report of that date, but in view of the remarkable results obtained, and of all the circumstances in connection with the case, I have thought it best to make the present statement complete in itself, although it is, after all, but a résumé of the exhaustive report furnished by Dr. Pethick, which is printed herewith.

Leaving out details to be dealt with by him, I may state that all the sixteen cattle kept in the old and supposedly infected stable, and fed on imported hay, which was, of course, free from ragwort, remained perfectly healthy for the entire period of twenty-three months during which the experiments were in progress, although in the summer of 1905, eight of these cattle were kept in a weed-infested pasture, in which fourteen animals had died of hepatic cirrhosis, in the short space of five months. Several of these animals had also been placed from time to time in close and continued contact with diseased animals, with a view to ascertaining whether or not the disease was transmissible in this way.

During the summer of 1905, also, ten of these animals were inoculated in various ways, either with blood or abdominal ascitic fluid, taken from an animal affected with Pictou Cattle Disease, to such an extent that Dr. Higgins, our pathologist, reported the cirrhotic lesions of the liver to be more extensive than in any of the others which he had examined. In spite of these severe tests, the animals continued to thrive, and when I last saw them in September, 1905, were in excellent condition, those which had been fed grain presenting a remarkably fine appearance. Thirteen of these cattle were slaughtered between October 10 and November 1, under the careful inspection of Dr. Pethick, as well as of several experienced butchers, all organs being found healthy and the flesh of superior quality. Specimens from the different organs were also forwarded to the laboratory here, and pronounced by our pathologist to be absolutely free from disease. The other three animals, being pregnant cows, were allowed to live, and, according to latest reports, are in excellent condition, and in full flow of milk, after having given birth to healthy calves.

Of the sixteen animals which were kept in the new stable and fed upon local hay, which contained a considerable quantity of ragwort, fifteen died of Pictou Cattle Disease between July 19, 1904, and August 21, 1905. I may add that to prevent the possibility of doubt as to the cause of death in these animals, specimens from the internal organs of each were forwarded to Dr. Higgins, who verified the diagnosis in every case. The sixteenth animal, No. 12 of Dr. Pethick's report, was slaughtered on October 13, 1905, and although to all external appearances healthy, the pathological examination of the organs showed a slight affection of the liver, and the presence of several characteristic ulcers on the lining of the true stomach.

Of the two other animals mentioned above, one of which was fed on chopped ragwort, and the other on oat straw, each receiving a small allowance of bran, the former died of acute hepatic cirrhosis on July 22, 1904, while the latter

remained healthy during the entire test, and, when slaughtered on October 24, 1905, was found to be absolutely free from the slightest appearance of disease.

A calf six months old, born on the premises, was fed twice daily upon a mixture of one part of ragwort before flowering, and twenty parts of clean hay, reinforced by a daily ration of two pounds of fresh oats. This experiment, which was undertaken for the purpose of ascertaining if the weed would produce the disease at this stage of its growth, began on December 1, 1904. The calf died on May 26, 1905, post mortem and pathological examinations revealing an advanced stage of hepatic cirrhosis. The contact and inoculation experiments, which are described in full detail in Dr. Pethick's report, were absolutely without result, it being evidently practically impossible to transmit the disease from one animal to another.

In view of the results of these practical experiments, which have been carried on with the greatest possible care and exactitude, there need, I think, be no longer any doubt as to the cause of Pictou Cattle Disease, and I have, therefore, already recommended that it be removed at once from the list of affections dealt with under the Animal Contagious Diseases Act.

While subsidiary experiments conducted by Dr. Pethick show that some benefit undoubtedly results, especially in incipient cases, from the strychnine and iron treatment described by him in a previous report, measures of this kind are of little real value. The efforts of the local authorities and of the stock owners in the affected district should at once be directed towards the eradication of the plant, which is undoubtedly the cause of the whole trouble.

Owing to the topographical and other conditions existing in the district, it will be quite impossible to get rid of the weed by cultivation, although, on arable land, much can, of course, be achieved by this means. There is, however, much rough and partially wooded country, most of which is badly infested with ragwort, to eradicate which, by any ordinary methods, will be practically impossible.

It has long been noted by intelligent residents that sheep seem to be able to eat the weed with impunity, although some hold that, after a considerable period, injurious effects are produced, which, if the diet is continued, eventually cause death. It is also held that, even where the plant does not prove fatal, the mutton is rendered unmarketable by a yellow staining, which, after a time, becomes distinctly noticeable.

As to one fact there is, however, no doubt, viz., that the keeping of sheep on land infested with ragwort is one of the most certain means of bringing about its complete eradication in a short time. This being the case, and in view of all the circumstances, I decided to inaugurate a series of experiments for the purpose of ascertaining whether or not sheep could profitably be utilized for this purpose. I, therefore, early in 1905, authorized Dr. Pethick to purchase four sheep, which were kept during the summer on four acres of very weedy pasture, with the result, as shown by the accompanying pictures, of completely destroying the ragwort which formerly grew in profusion. So far, these animals have shown no symptoms of disease. Several other sheep were purchased a little later for the purpose of ascertaining at what stage, if any, the tissues began to exhibit the yellow stain to which reference has already been made. These animals have been slaughtered at intervals, and the flesh carefully examined, but no abnormal appearance has been so far observed.

The lease of the premises being for three years, I determined with your permission, upon the conclusion of the experiments with cattle, to purchase

a number of sheep with a view to securing definite information on the points mentioned above. If it can be shown that sheep eat ragwort with impunity and that no deleterious effects are produced upon the mutton, it goes without saying that they will constitute by far the most practical and profitable agency which can be used by the residents of the affected district in ridding their farms of this dangerous pest. The country in which the weed is found is one exceedingly well adapted for sheep culture, and I am convinced that the introduction to the district of this branch of husbandry at the present time, when both wool and mutton are increasing and likely to increase in price, will prove highly profitable.

As stated above, there is much rough pasture while the arable land has, in many cases, been seriously impoverished by the crude methods of cultivation in vogue, and would be at once enriched and improved by the keeping thereon of a reasonable number of sheep.

I, therefore, authorized the purchase, in November last, of forty sheep, which were divided into two lots, one score being fed during the winter on weedy hay, while the others were fed upon hay grown in the district but from which all ragwort had been carefully removed.

Eight goats were also purchased, four being placed with each lot of sheep. These animals have all wintered well, and it is my intention, as soon as pasture becomes available, to subdivide them again, keeping ten sheep and two goats of each lot on clean pasture, and a similar number on pasture badly infested with ragwort. By this means it ought to be possible to ascertain with a reasonable degree or certainty what are the actual effects of ragwort upon sheep, as well as to a certain extent also upon goats.

It might, perhaps, be advisable to continue this experiment even longer than is proposed, but I am in hope that by the close of the present season we will be in a position to give definite and reliable advice as to the utilization of these animals in stamping out ragwort, and with it the long dreaded Pictou Cattle Disease.

Concurrently with the above, an experiment is being carried on with the view of fixing even more certainly upon ragwort the responsibility of causing hepatic cirrhosis. Three healthy young cows have been, since November 1, 1905, fed on locally grown hay from which all weed has been removed, while three others are fed on similar fodder containing the ordinary quantity of ragwort usually produced in the meadows of the neighbourhood.

In January last, also, a disabled mare of little value was purchased and is being fed twice a day on hay containing a large quantity of ragwort, chopped fine and carefully mixed. This experiment is controlled by feeding a horse, kept at the station, on hay from which the weed has been entirely removed.

I have much pleasure in again referring you to the careful and elaborate report of Dr. Pethick, who deserves much credit for the systematic, exact and painstaking manner in which he has carried out these important experiments.

J. G. RUTHERFORD,
Veterinary Director General.

The Honourable
 、 The Minister of Agriculture,
Ottawa.

W. H. PETHICK, V.S.

ANTIGONISH, October 31, 1905.

SIR,—I have the honour to submit a report of the investigation into the cause of the Pictou Cattle Disease, conducted at the Government Experimental Station, Antigonish, during the year just ended. Before dealing with the experiments, which I have had the honour of conducting under your direction, I beg liberty to offer a few general remarks on the subject.

The early history of Pictou Cattle Disease, we must confess, is somewhat shrouded in mystery, but from careful inquiry of the older inhabitants, we learn that the disease first made its appearance in the town of Pictou, about fifty years ago.

Mr. Connell, of the Customs Department, remembers the first outbreak. The older people interviewed all claim that the plant 'Ragwort' (*Senecio jacobea*) had by this time a footing in that town. They say that the weed was imported in ballast from Europe and landed at Hatton's wharf, and at an early date was believed to be the cause of the new cattle disease, and so firmly was this believed, that Mr. Gordon, who was then street commissioner, imposed a fine upon those who did not destroy the weed found growing in front of their lands.

We are told that from the town of Pictou the weed spread to West River, thence to Greenhill, New Glasgow, Fraser's Mountain, Merigomish, and along the gulf shore into Antigonish county, as far east as Cape George. We are told the disease followed, and in no instance did the disease overstep the weed limit, and where there was no weed no disease existed.

Upon looking at the accompanying map, you will see the extent of the present weed area. The portion shaded shows where it exists as a troublesome agricultural weed, that is in pastures and hay fields and as a stray plant along the roadside and railway it probably extends over nearly the whole of Pictou and Antigonish counties, and is making some progress into the northern part of Guysborough county.

The spreading of the weed to a greater distance east of Pictou than to the west is accounted for by the fact that the prevailing winds here in winter are from the northwest. The heavily shaded portion indicates the territory where the cattle disease exists.

A noticeable feature in the spread of the disease is a tendency to remain stationary in a locality for perhaps a year or two and then extend somewhat rapidly, taking in a few more miles of territory and again becoming stationary.

I have not an opportunity of obtaining very accurate statistics. Dr. William McEachran states in his report that up to 1881, one thousand three hundred and ninety-six head of cattle had died, and during that year two hundred and three animals had succumbed. This seems to have been the greatest mortality in any one year to that date. Since then, if we can say that a considerable number of cases are not reported, we might estimate the average yearly mortality at two hundred head.

When this disease visits a farm it remains for years, or until 'Ragwort' is eradicated, causing the loss of from one to six or eight head annually. On some farms the total loss in fifteen or twenty years has exceeded sixty head; on some the entire stock has been lost, and upon restocking, has been lost again; on some the loss was so heavy that stock-keeping had to be abandoned.

Heretofore the disease was believed to be confined to portions of Pictou and Antigonish counties, but in August, 1903, it was discovered near Souris, P.E.I., 'Ragwort' is also growing abundantly in this district, and from the evidence of farmers who have lost cattle, it is evident that the disease has during the last seven or eight years been accountable for the loss of sixty or seventy head in this locality.

Our suspicion that the disease also exists near Alberton, P.E.I., where 'Ragwort' has also a footing, was confirmed last summer, and we have good reasons to fear that this troublesome malady exists undiscovered in localities both on the island and mainland.

Although some valuable information has been gained through the investigations conducted at different times by Professor William Osler, Professor Adami, and the late Dr. Wyatt Johnson regarding the morbid anatomy of the disease, the cause remained a mystery. The popular opinion that the disease was due to the eating of 'Ragwort' had led to some feeding experiments being conducted under the supervision of Dr. William McEachran. These experiments, so far as they extend, gave negative results, and the plant was consequently pronounced innocent, and the old theory that the disease was due to some unknown contagion was adhered to.

Fortunately you visited Eastern Nova Scotia in 1902, and realizing the disastrous effect of this disease upon the live stock interests of the affected counties, decided to establish an experiment station within the disease-area where the disease could be studied, and feeding and other experiments conducted, and continued for a sufficient length of time to make the result conclusive.

You, sir, have already a perfect knowledge of the result, and indeed, every detail of the work at this station. But the probability that this report may be read by many interested people, and, as it seems to me very important that the most skeptical should be convinced that the cause of Pictou cattle disease has at last been settled beyond a doubt, to the end that a united effort be made to exterminate the plant 'Ragwort,' which, besides being accountable for cattle disease, grows at the expense of useful fodder plants, and is an enemy of the agriculturist in every sense of the word, I beg leave to give a detailed account of the different experiments which I have had the honour of conducting under your direction.

Before doing so, I would say that many different theories have been advanced both by the learned and unlearned, regarding the cause of the Pictou cattle disease. Some claim that the causative agent exists in the soil of certain localities, in the form of a micro-organism. Others, that it exists in the body of the animal. It was thought by many that infected stables were accountable, while others were of the opinion that actual contact was necessary for its spread. A few pointed to the possibility of inoculation being accountable, but by far the greater number looked upon 'Ragwort' with suspicion, but these again were divided, some claiming that the injury was done while the animal was at pasture on 'Ragwort' land; others that the weed was only injurious when mixed with the hay and fed during the winter months. A few believed

that the plant, if got before flowering, was innocent. Nearly all were of the opinion that good or poor feeding rendered animals more or less liable to the disease, many claiming that good feeding gave complete protection.

Your wisdom in investigating the cause, with each of these theories in view is obvious, and those who will read this report to the end will find their opinion either confirmed or negatived by a thorough and practical experiment.

In order that the records of the experiments may be the more complete, I have thought well to copy in part from my report of last year's work, and have added thereto the additional information gained, giving the results to date.

EXPERIMENT No. 1.

The object of this experiment was to ascertain whether the disease was communicable through the medium of infected stables, if so, does feeding, good or poor, render the animal more or less liable to contract the disease.

In this test sixteen animals ranging from one to five years old were employed. They were housed in an old frame stable, in which thirty-six head of cattle had previously suffered from Pictou cattle disease. The building was not disinfected, or any precautions taken to guard against infection from that source.

These animals were fed upon hay absolutely free from 'Ragwort,' imported from Quebec.

These were subdivided into lots of four, and the following daily ration allowed:—

A—D, full hay ration with four pounds grain mixture.

E—H, full hay ration with two pounds grain mixture.

I—L, full hay ration without grain.

M—P, restricted allowance of hay without grain.

While all these animals were during the first summer pastured on land comparatively free from 'Ragwort,' this season eight members of the herd, namely (A), (B), (E), (F), (I), (J), (M) and (N) were grazed, not only upon weedy pasture, but on one in which no less than fourteen head of cattle had died of cattle disease within five months.

All the members of this herd remained in perfect health during the entire test which extended over twenty-three months, the younger ones growing nicely and looking sleek and thrifty. While all were at the time of sale in good market condition, those which had received a grain ration were prime butcher's cattle.

In accordance with your instructions, all these animals except (C), (E) and (F), which were held over because of advanced pregnancy, were slaughtered between October 10 and October 31 under my inspection. A careful postmortem examination revealed nothing abnormal. Specimens of different organs from each were forwarded to the Biological Laboratory, Ottawa.

The pathologist's report confirms my opinion that all were healthy.

In order to avoid the possibility of criticism or doubt on the part of any, the animals were slaughtered in the presence of experienced butchers, who agreed that all the organs were healthy, and the flesh of that good colour which characterizes healthy beef.

EXPERIMENT No. 2.

To decide whether the disease is due to the ingestion of 'Ragwort,' if so, does good or poor feeding render more or less liable to disease.

The sixteen animals employed in this test were procured from well outside the disease-area, and housed in a new isolated stable built for the purpose. They have never since been in contact with other animals, or exposed to outside contagion. It will be noticed that while all were fed on hay containing 'Ragwort,' every four received a different ration, as follows:—

1—4, sufficient hay containing 'Ragwort' and four pounds grain mixture.

5—8, sufficient hay containing 'Ragwort' and two pounds grain mixture.

9—12, sufficient hay containing 'Ragwort' without grain.

13—16, a restricted allowance of hay containing 'Ragwort' without grain.

As this experiment is most important, I beg leave to give a separate record of each animal during the entire test. As this must of necessity be brief, I shall only mention conspicuous symptoms and postmortem lesions.

ANIMAL No. 1.

A steer two years old*, native bred, average size. This animal fed well and appeared in good health until May 1, 1905, when premonitory symptoms of Pictou cattle disease were observed, and in the use of the term, I beg to say that our experiment goes to show that this disease is progressive and runs a much more chronic course than previously believed, and to the careful observer who takes pains to become familiar with the appearance and disposition of each animal under his care, certain premonitory symptoms may be observed in some instances months before the more characteristic symptoms are manifest.

In this case, as indeed in nearly all others, we noticed a peculiar bleached appearance of the hair, which seemed to have lost its lustre, a desire to be alone, irritation of temper or nervousness, occasional chills, although in a moderately warm stable. This animal would stand and shiver while the healthy members of the herd appeared comfortable. The bowels are irregular, the pulse at this stage is fast although quite strong, temperature slightly above normal.

On May 16 the more characteristic symptoms set in, visible mucous membrane, pale, eyes amaurotic, slight diarrhoea, emaciation.

June 3. Symptoms much aggravated, very weak, staggering gait, pulse 81, temperature 100.

June 11. Unable to rise. Died June 14, 1905, being eighteen months and twenty-one days from beginning of experiment, and forty-four days after first symptoms were noticed.

Post-mortem. Noticed muscles pale, abdominal cavity contains about three gallons dropsical fluid, marked wasting of mesenteric and omental fat, which is saturated with fluid, rumen half full of food, mucous coat very dark, sub-mucous coat dropsical. The second and third stomachs are partly filled with food, the muscular coat of abomasum is thin and covered with blebs or serous fluid, mucous coat saturated with fluid and dotted here and there with ulcers, some ulcers are recent, some few are healed with scar tissue. The liver is normal in size, somewhat mottled. The capsule is very adherent, and the pulp appears cirrhotic.

*The ages given are those of the animals at commencement of experiment.

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Post-mortem. The flesh is pale and of slightly yellow colour. There is much ascites. The omentum is saturated with fluid. The coats of stomach are oedematous, considerable ulceration of true stomach, ulcers appear recent. In this case, there is fluid under the mucosa of all the intestines; liver is somewhat small; substance shows fibrous bands; gall bladder very large; contains eighteen ounces dark green bile; kidneys are very pale; pericardial sac contains five ounces fluid.

ANIMAL No. 4.

Heifer, one year old. This was a very thrifty animal and continued in apparently perfect health until June 19, 1905, when primary symptoms of cirrhosis set in. The more acute symptoms developed rapidly. By June 28, she had lost much flesh. Diarrhoea was now constant, appetite gone.

July 6. Temperature slightly sub-normal. Pulse very intermittent. The skin and visible mucous membranes are of a decidedly yellow tinge. The eyes, though amaurotic, were not so bright as noticed in some other cases. There was swelling of the lower eyelids.

July 10. Lying down; occasional tenesmus; temperature has fallen to 98.

July 15. Died of Pictou Cattle Disease. being nineteen months and twenty-one days from beginning of experiment and twenty-six days from beginning of sickness.

Post-mortem examination reveals the usual gross lesions; ascites is very marked, and the mesenteric fat is decidedly yellow. The mucosa of abomasum hangs in loose folds, containing many ulcers. Many of these are pigmented. The mesenteric lymph glands are much enlarged and soft; the spleen pulp is very dark. The liver, though normal in size, is exceptionally tough, and shows fibrous bands.

ANIMAL No. 5.

Steer, two years old; native breed; not a very good feeder; of a nervous temper, and did not thrive as well as some of the others. He was apparently healthy until February 2, 1905, when he began to lose flesh and had the appearance of a poorly kept animal. Other suspicious symptoms developed, and by March 22, we were able to diagnose the disease as cirrhosis. Except for progressive emaciation, little change was noticed until April 25, when he became decidedly worse. The symptoms became more pronounced. On May 12, he developed violent cerebral symptoms; was almost constantly in motion, occasionally shaking his head. Sometimes he would stop to take a bite of grass, but appeared unable to swallow (probably due to spasm of oesophagus). The amaurotic condition of the eye was very pronounced. Extra flexion of the knee, which I may say is a fairly constant symptom, was very noticeable, the feet being raised higher from the ground than usual. The action, however, is slow, and the animal seems to hesitate at every step.

On the 21st, he seemed to have gained new strength. Cerebral symptoms were aggravated, the animal running madly about until completely exhausted. He died May 23, 1905, being seventeen months and twenty-nine days from the beginning of experiment and seventy days from date of first reliable symptom.

Post-mortem examination revealed the usual gross lesions. There was not, however, so much ascites, nor was the gall so large as noticed in other cases,

but the liver pulp was very gray. There was also much ulceration of the mucosa of abomasum.

ANIMAL No. 6.

Steer, two years old; small. This animal appeared perfectly normal until July 9, 1905, when he exhibited first symptoms of cattle disease.

On August 1, the more acute symptoms developed. In this case, which was the quiet or dull type, which I may say is the form usually met with, in weak subjects, the animal would be found in a fence corner standing quiet or lying down, showing no inclination to join the herd, but rather a desire for concealment.

August 5. Diarrhœa has set in and the temperature is sub-normal, $98\frac{1}{2}$. The respiration is deep, twenty to a minute; pulse 81. The eye is not so bright as in other cases, and there is no hemorrhage into the conjunctiva. The lower eyelids are much swollen, and there is evidence of much ascites.

August 10. Lying down. The body is covered with cold sweat. Sticky saliva escapes from the mouth at intervals.

August 11. Semi-comatose. Died August 12, 1905, being twenty months and nineteen days from the beginning of experiment, and thirty-four days from the date when first symptoms were observed.

Post-mortem shows the usual lesions. There was much ascites (fully six gallons). The abdominal fat was replaced with layers of jelly-like lymph. The small intestines contained a considerable quantity of sand (this we noticed in many cases). The stomach ulcers are much pigmented.

ANIMAL No. 7.

Heifer, one year old, average size. This animal showed no signs of illness until April 1, 1905, when we noticed the first symptoms of cattle disease. She, however, continued to feed well, and kept quite strong.

On June 5, the characteristic symptoms developed abruptly, which were similar to those exhibited by animal No. 5. She died June 15, 1905, being eighteen months and twenty-two days from beginning of experiment and seventy-six days from date of first symptoms.

Post-mortem examination showed a typical case of Pictou cattle disease.

ANIMAL No. 8.

Steer, one year old; average size. This animal appeared to be healthy until July 15, 1904, when I noticed the following entry:—

Not feeding well; losing flesh, and on August 8 slight diarrhœa and usual symptoms of Pictou Cattle Disease.

September 1. The acute symptoms (similar to No. 1) had developed. Died on September 7, 1904, being nine months and fourteen days from beginning of experiment and fifty-four days from beginning of sickness.

Post-mortem examination showed a well developed case of Pictou cattle disease, the only peculiar feature being the presence of considerable abdominal fat. This, however, is soft and yellow. The liver was smaller than usual, and apparently very cirrhotic.

ANIMAL No. 9.

Steer one year old, small. This was a good thrifty animal until May 30, 1905, when he presented the usual symptoms of cattle disease.

About June 20 he seemed to improve somewhat in appearance, but by July 21 he developed the characteristic symptoms already described. These were, however, of the quiet type and he lingered along failing every day. He died on August 21, 1905, being twenty months and twenty-eight days from beginning of experiment and eighty-two days from date of first symptoms.

Post-mortem examination showed the usual pathological changes resembling those noted in case No. 3.

ANIMAL No. 10.

A heifer one year old. This animal was rather thin but appeared healthy until April 2, 1905, when first symptom was noticed. On April 12 diarrhoea and other acute symptoms set in (similar to case No. 6). Died June 2, 1905, being eighteen months and nine days from beginning of experiment and sixty-one days after first symptom of disease.

Post-mortem showed the usual lesions.

ANIMAL No. 11.

Steer one year old, average size. This was a thrifty animal until April, 1904, when the usual premonitory symptoms were noticed. On May 1 the more acute symptoms developed. This, however, was a very chronic case. He would for a few days appear much better, then a return of the symptoms, but he would lose more than he had gained. He continued in this way throughout June and July.

On August 1 the symptoms became more severe, the animal becoming very weak.

On August 26 the temperature had fallen to 97. Died on September 1, 1904, being nine months and eight days from beginning of experiment and one hundred and twenty-three days from date of diagnosis.

Post-mortem examination revealed the characteristic lesions of Pictou cattle disease, but no change was worthy of special notice, the liver to the naked eye showing much fibrosis.

ANIMAL No. 12.

Steer one year old. This was a strong, healthy animal and a good feeder. He never gave evidence of sickness, and kept in fair flesh. However, he did not seem to grow as well as might be expected. He was killed on October 24, 1905, being twenty-four months from beginning of experiments. All the organs appear healthy to naked eye except a few ulcers on mucous coat of abdomen. Dr. Higgins has found upon microscopic examination a slight deposit of connective tissue around the bile ducts with the usual pericellular extension, as well as other characteristic changes in the liver, and although this deposit was so slight that it would be impossible to detect its presence except under high power, yet the result of this examination proves conclusively that this animal

also was affected with Pictou cattle disease, although not exhibiting any clinical symptoms.

This, I beg to say, is but another instance of the great assistance your inspectors derive from the Biological Laboratory under such capable management.

ANIMAL No. 13.

Steer one year old. This animal appeared in good health until about January 3, 1905, when he began to lose flesh. By February 1 the premonitory symptoms had developed, these becoming more pronounced until April 11, when the more acute symptoms were observed. Died on May 20, 1905, being seventeen months and twenty-six days from beginning of experiment and one hundred and twenty days from first symptom of disease.

Post-mortem examination showed the usual gross lesions of Pictou cattle disease.

ANIMAL No. 14.

Heifer one year old. Appeared in good health until about April 17, 1905, when first symptoms of cirrhosis were observed. The more characteristic symptoms developed about May 29. Appetite was very irregular; hind quarters became weak and paralyzed. On June 17 she became semi-comatose; pulse intermittent; temperature 99. Died on June 19, 1905, being eighteen months and twenty-six days from beginning of experiment and sixty-three days from date of first symptom of disease.

Post-mortem examination showed organs to be in much the same condition as that of No. 1.

ANIMAL No. 15.

Heifer one year old. This animal was very thrifty. Early in June she began to lose flesh, but fed well until June 7, when the acute symptoms (similar to No. 5) developed. Violent cerebral symptoms were noticed.

On June 16 she broke from the enclosure, becoming dangerous. Was shot on June 16, being nineteen months and twenty-two days from beginning of experiment and nine days after first symptom was noticed.

Post-mortem examination revealed the usual lesions. There was not much ascites, but the mucosa of the true stomach was much ulcerated and the liver very cirrhotic.

ANIMAL No. 16.

Heifer one year old. This animal appeared perfectly normal until June 2, 1904, when we observed the first symptoms of the disease. The more acute symptoms developed abruptly. These did not vary much in character from those exhibited by No. 3. She died July 19, 1904, being seven months and twenty-six days from beginning of experiment and forty-seven days from date of first reliable symptom.

Post-mortem examination showed this to be a typical case of cattle disease. There was fully five gallons of ascitic fluid in the peritoneal cavity, while the stomach and liver gave the usual lesions.

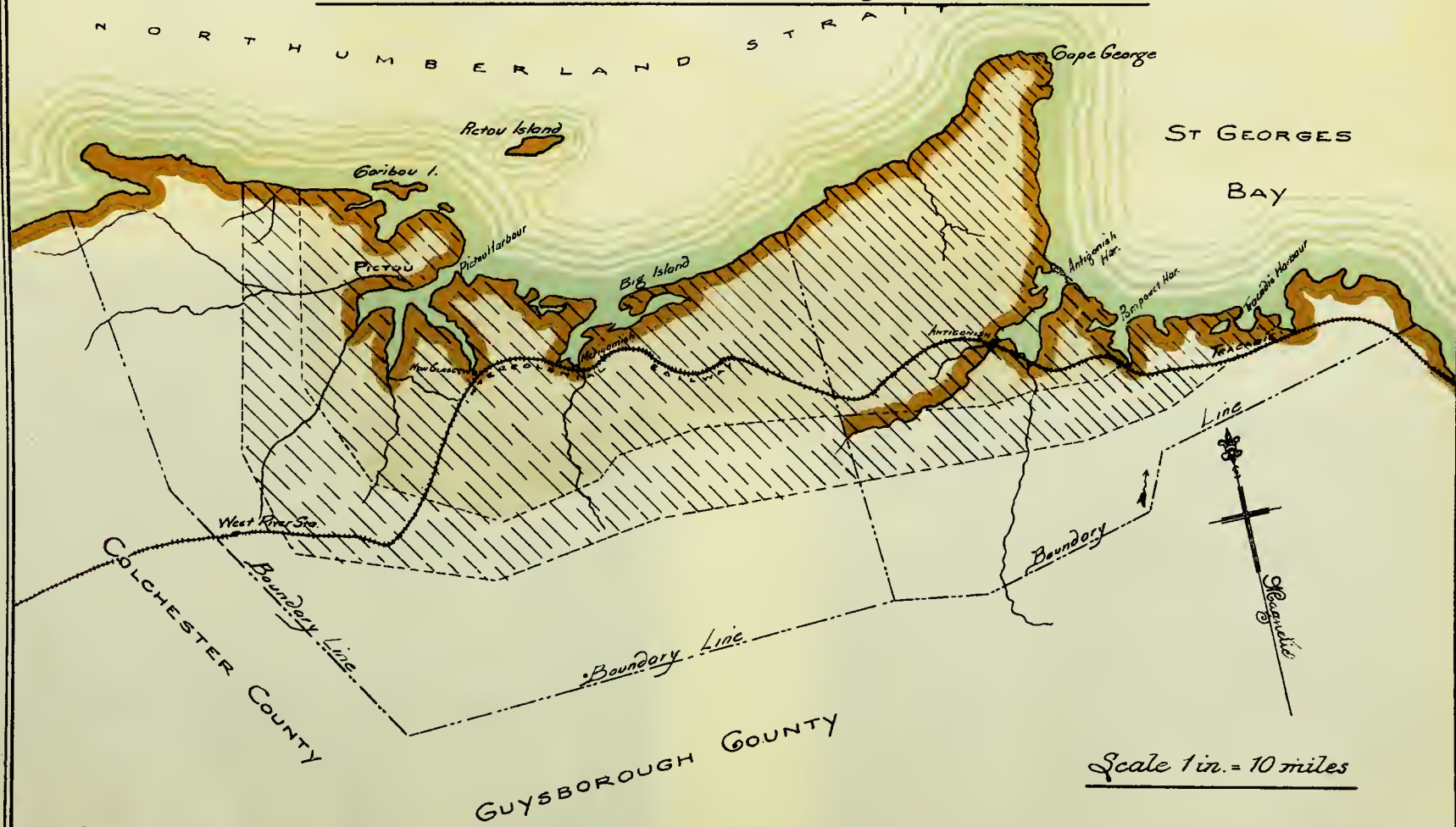


FIELD ON WHICH CATTLE WERE KEPT SHOWING GROWTH OF RAGWORT.



ADJOINING FIELD ON WHICH SHEEP WERE KEPT, SHOWING EFFECT ON WEED.

MAP OF PICTOU AND ANTIGONISH COUNTIES, N. S.



Shaded portion shows where *Senecio Jacobea* exists as a troublesome agricultural weed. Tinted portion indicates territory covered by cattle disease (*Septicæmia*).

NOTE: This weed and disease extends much further East than West of the starting point, Pictou Town

THIRD EXPERIMENT

To ascertain if the feeding of 'Ragwort' (which had been separated from the hay with which it was growing and thoroughly cured) would produce the disease.

This test was conducted in a new stable, the subjects being two two-year-old steers, quite healthy, about the same size and weight. Animal No. 17, steer two years old, was fed twice daily on chopped 'Ragwort' with a little bran, while animal No. 18 was fed twice daily on chopped oat straw with very little bran. Although somewhat thin, No. 17 was bright and apparently healthy until July 14, 1904, when symptoms of cattle disease developed abruptly, characterized by severe nervous disturbance and loss of power of the limbs, palpitation, rapid action of the heart, sub-normal temperature and extreme emaciation. Died on July 22, 1904, being seven months and twenty-eight days from beginning of experiment and eight days from date of first definite symptom.

Post-mortem examination revealed a well developed case of Pictou cattle disease.

ANIMAL No. 18.

Steer two years old. This animal continued in good health during the entire test and was slaughtered for beef on October 24, 1905, being twenty-three months from beginning of test. All the organs were upon careful examination found to be perfectly normal. This was verified by the pathologist after examining the specimens forwarded him.

FOURTH EXPERIMENT.

To ascertain if 'Ragwort,' if cut before flowering, would produce the disease. A quantity of 'Ragwort' was cut before flowering and mixed with twenty times its bulk of clean hay.

A calf six months old (No. 19) was fed twice daily upon this mixture, also receiving two pounds crushed oats. The feeding began on December 1, 1904. The animal did not grow well but appeared fairly healthy until May 1, 1905, when diarrhoea set in. He now failed rapidly, exhibiting symptoms of nervous disturbance, followed by notable dejection. He died on May 26, 1905, being five months and twenty-six days from beginning of experiment and twenty-six days from date of first symptom.

Post-mortem changes did not vary much in character from these already described.

CONTACT EXPERIMENT.

Two healthy young animals (G. and N.) were, on April 7, 1904, placed in an isolated stable and tied in the same stable with an animal suffering from cattle disease. All were fed on imported hay out of the same manger and watered from one pail.

During the summer the contact animals were kept in an enclosure with the animals affected with the disease. No precaution was taken in any way to guard against infection.

The contact animals remained perfectly healthy during the entire test, and were slaughtered for beef on October 23, 1905.

Post-mortem examination showed the organs normal, as was verified by the pathologist.

Even more striking proof of the non-contagion of the disease will be found in the case of animal No. 18 (experiment No. 3).

This steer was stabled during two winters and pastured during two summers with the 'Ragwort' fed cattle. Sixteen of these animals lived and died at his side. He fed over the ground on which they had fallen; was often noticed licking the sick ones when they were unable to rise. He was kept in an exactly similar way to the others except that 'Ragwort' was withheld.

INOCULATION EXPERIMENT.

The blood and ascitic fluid used in this test was obtained from experiment heifer No. 4. In his report upon the specimens from this case, your pathologist states that the cirrhotic condition of the liver was more extensive than in any of the experimental cases that he had examined, thus leaving no room for doubt as to the reliability of the material employed.

Subcutaneous inoculation—

Cow (B.)	Fifteen cubic centimetres of fresh blood.
Steer (J.)	Thirty " " "
Steer (K.)	Fifteen " " ascitic fluid.
Heifer (L.)	Thirty " " "

Intravenous inoculation—

Heifer (M.)	Fifteen cubic centimetres of fresh blood.
Heifer (O.)	Thirty " " "

Intraperitoneal inoculation—

Steer (D.)	Fifteen cubic centimetres of fresh blood.
Steer (A.)	Thirty " " "
Steer (H.)	Fifteen " " ascitic fluid.
Heifer (P.)	Thirty " " "

These animals were inoculated on July 15, 1905, there was no swelling at point of injection or any ill effects of any nature. Temperature and pulse remained normal throughout. The animals were slaughtered between October 10 and October 31, 1905. Post-mortem examination gave no lesions of any description.

A similar test, in which guinea pigs were employed, gave negative results.

I beg to submit that the above experiments prove clearly that Pictou Cattle Disease is not contagious, either by means of stable, pasture, contagion or inoculation, but is caused solely by the ingestion of 'Ragwort,' or by some deleterious substance which it imparts to the hay.

TREATMENT.

As to treatment, I have little to say. My observations during the past year confirm the opinion that the strychnine and iron treatment (outlined in my last season's report) will, in many cases, prolong the life, and in incipient cases, may enable the owner to get the animal into marketable condition, but medicine cannot repair the morbid changes in the liver, and it is very doubtful if much practical benefit can be derived therefrom.

PREVENTION.

Eradication of 'Ragwort' is the first essential. I believe, sir, that you are of the opinion that sheep and perhaps goats, will prove a most valuable aid in the fight that should at once be made against this plant. I heartily concur in your opinion, and firmly believe that if sheep were confined in sufficient number upon weedy farms and concerted action taken to cut the weed wherever found, in a few years the land will be free from 'Ragwort,' and, consequently, from cattle disease.

The following experiment helps to confirm this opinion. Four sheep were confined since April 1, 1905, on four acres of very weedy pasture. The field (as will be seen from the photograph which I have the honour of sending you) is entirely free from 'Ragwort,' while it is bounded on all sides by a luxuriant growth of the plant. More extensive experimentation, however, along this line is necessary before sufficiently reliable information is gained.

While it is generally admitted that sheep will destroy 'Ragwort,' the opinion prevails that the plant has an injurious effect upon the sheep, first by causing sickness and death, secondly by staining the tissues and rendering the flesh unmarketable.

All these are points of vital interest to the farmer and stock owner, and I am glad to learn that you have under consideration a series of experiments which I believe will be of most practical value.

In conclusion, I am glad to be able to say that no contagious disease has visited this country during the year, although I have investigated the usual number of reported outbreaks. I have, however, caused to be slaughtered sixty head of cattle, these being infected with Pictou Cattle Disease. Detailed accounts of each case have been forwarded to you.

I have the honour to be, sir,
Your obedient servant,

W. H. PETHICK,
Inspector.

The Veterinary Director General,
Ottawa.

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Special report on Pictou cattle disease,



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